

HOUSEHOLD HAZARDOUS WASTE PROGRAM:
POPULATION DEMOGRAPHICS

by

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Abstract

My master's project and field experience provided me with a wide variety of opportunities for personal growth, as well as acquainted me with the different aspects of the field of public health. My capstone project developed a method by which the Johnson county Household Hazardous Waste site was able to consolidate their data in a way to quickly analyze the results from the 92,402 appointments they have developed from the past 12 years and will continue to add data.

Principally my project and field experience focused on organization of data and analysis of the areas we serve, and potential demographics or areas of the county the site might not be serving sufficiently. I was able to visualize the data through the use of a geographic information system. This program allows public health workers to visualize, question, analyze, and interpret data to understand relationships, patterns, and trends. This program was essential to understanding what is happening and what might happen in a geographic space. The household hazardous waste site is a county funded facility that is critical to the health and safety of not only the environment by keeping hazardous waste out of the city dumps, but also gives people a place to dispose of their environmentally hazardous chemicals in a safe way. Lastly my project was accepted by the North American Hazardous Materials Management Association (NAHMMA) to be presented, where my preceptor Julie Davis will present the data and PowerPoint I put together for her.

In this report, I will discuss the project and field experience

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I would also like to thank my major advisor, Dr. Melinda Wilkerson, and my committee members Dr. Abbey Nutsch, Dr. Steve Dritz, and Barta Stevenson for their knowledge, guidance, and encouragement through this experience. I can't express how much you have helped me along this endeavor to completing my masters you have been nothing short of a life saver.

Lastly, I would not be where I am today without the support of my parents who have supported me in my graduate career, always pushing me to do my best, and believed in me through this journey.

Chapter 1 - Introduction

Many industrial and consumer products, including solvents, pesticides, fuels, fertilizers, paints, household cleaners, and disinfectants contain hazardous substances. Improper disposal of these materials can lead to unknown and unexpected release of toxins that are hazardous to humans as well as harmful to the environment. Improper disposals are defined as events in which a hazardous substance is placed in a municipal waste system and subsequently causes a release or potential release that could require cleanup, removal, or neutralization according to the requirements of federal, state or local laws.

The Agency for Toxic Substances and Disease Registry (ATSDR) a federal agency was created by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980. The mission of ATSDR is to mitigate or prevent adverse human health effects and diminished quality of life resulting from exposure to hazardous substances in the environment.¹⁶ Furthermore, the ATSDR initiated medical evaluation efforts and programs to address hazardous waste site and substance-specific information needs. The program include the organization of public health assessments for individual County and City hazardous waste sites and health studies, as well as the establishment and maintenance of public health surveillance systems and registries of people exposed to hazardous waste substances.

Since 1986 ATSDR has conducted health assessments on the public near more than 1,200 sites identified on the Environmental Protection Agency's National Priorities List (NPL), as well as more than 85 health-study activities on the workers at those sites. Additionally ATSDR has evaluated the chemicals that are posing the most human health hazards at NPL sites. The list of the 275 hazardous waste substances is based on:

- 1) The frequency in which a chemical was found on an NPL site.

2) The chemical's toxicity, Lethal Dose 50% (LD50)

3) The likelihood of humans being exposed to the chemical.

Information derived from health studies, toxicology profiles, and public health assessments were used to develop the list of seven priority health conditions known as (PHCs):

1) Cancers (selected sites), 2) Reproductive disorders, 3) Kidney dysfunction, 4) Immune disorders, 5) Lung and respiratory diseases, 6) Liver dysfunctions, and 7) Neurotoxic disorders.²⁰

The ATSDR used the following approaches in their research to examine PHCs:

1) Evaluation of the occurrence of adverse health effects in a specific population. This includes the use of disease symptoms; biological markers of disease, susceptibility, or exposure; self-reported health concerns, and ecologic epidemiology studies and evaluation of the incidence or prevalence of disease.

2) The identification of risk factors for adverse health effects from exposure to hazardous waste sites were used to build hypotheses that were generated in cohort or case-control studies of the potentially affected populations to identify: a) Risk factors that may be mitigated by preventative actions. b) The links between exposures and adverse health effects.¹⁷

3) Work to develop methods to diagnose adverse health effects. That includes medical research to identify and validate new biological tests to be used in the evaluation of disease occurrence in the potentially affected populations.¹⁷

4) Diagnosis of the adverse health effects in people. This included clinical based research to identify and evaluate diagnostic tools and treatment regimens that could benefit people who develop adverse health effects caused from exposure to hazardous substances.¹⁷

The nation has a one health objective to eliminate substantial health risks from NPL hazardous waste sites, through clean-up efforts that should eliminate immediate and substantial

health threats, based on the 3rd health assessment. In the United States there are 1,300 hazardous waste sites and nearly 2 million people who live within one mile of these sites.⁴ Thus this priority is of the utmost concern to the NPL.

In order to evaluate the health risks going into the future for exposed populations, the ATSDR will use the seven PHCs to assess the occurrence of these potential health adverse health effects and the relationship between effects and specific exposures to certain hazardous substances. Additionally the PHCs will assist public health officials in setting their priorities and effectively direct national environmental public health epidemiologic research efforts. These further studies should be able to provide critical information that will be used to reduce the burden of exposure to hazardous substances and their potentially adverse health effects on the public.

ATSDR maintains the Hazardous Substances Emergency Events Surveillance (HSEES) system to collect and analyze data about the public health consequences of hazardous-substance release events (i.e., morbidity, mortality, and evacuation). The following case reports illustrate the danger to waste management personnel and the public when hazardous waste is disposed of improperly.¹

From January 2001 to March 2005 a total of 36,784 events involving release of hazardous substances were reported to HSEES in 18 states. Of these events 33% resulted in injuries to people, 93% of whom were sanitation workers with the most common injury being respiratory irritation.⁵

In Washington of June 2002, hydrochloric acid from an illegal methamphetamine laboratory was disposed of in an apartment building dumpster. A sanitation worker sustained respiratory irritation when the acid was dumped into the back of the trash containment area.

After the exposure, the supervisor took the worker to a physician for observation. Law enforcement, fire department officials, and an environmental agency responded to the event.³

In March of 2003 in Colorado, a hospital employee improperly disposed of a quantity of radioactive waste in the hospital dumpster, and the dumpster contents were picked up by a garbage truck. As the garbage truck approached the landfill, the contents in the trash containment area of the truck activated the radiation detectors at the landfill. Access to the landfill was restricted until the radioactive content was removed. The first four responders were decontaminated at the site, but no injuries were reported.⁹

In June of 2004 in New York, a sanitation truck equipped with an onboard compactor contained improperly disposed of drum of hydrochloric acid, releasing approximately 10 gallons of this hazardous substance into a residential area. Two sanitation workers sustained chemical burns. Luckily they were decontaminated at the scene, and treated at the hospital. This event required response by law enforcement, fire department officials, emergency medical personnel, and a hazardous material (HazMat) team.⁹

These examples illustrate the dangers that are associated with the improper disposal of hazardous substances. Households in the United States generate approximately 1.6 million tons of hazardous waste each year. Average households can accumulate approximately 100 pounds of hazardous waste in garages, storage closets, and in basements.⁸ Because many of these substances are flammable, toxic, explosive, or corrosive, they can be dangerous when disposed of improperly. This hazard is of concern to local sanitation workers because most sanitation trucks are equipped with compactors, which can easily compromise hazardous substance containers, resulting in release and mixing of substances.

The nation also has a problem with uncontrolled disposal sites that may contain hazardous waste and other contaminants.¹⁷ There are over 33,000 uncontrolled disposal sites in the United States containing hazardous waste and potentially other environmental containments.

The findings in this section of the report are limited in two ways. Reporting of events is not yet mandatory to HSEES, thus the participating state health departments might not be informed about most events. Secondly, there are only 18 state health departments that provided data to HSEES during this reporting period. Therefore we are lead to believe the data underrepresents the total hazardous-substance release events in the United States.

These findings suggest the need for the development as well as the implementation of effective public health strategies to prevent the improper disposal practices and injures that can result from the improper disposal of these substances.^{3,15,18,20} For the general public we need to teach them proper methods for disposing of hazardous substance. In order for the public to understand the dangers to the environment, and sanitation worker with the improper disposal of hazardous substances. Let the public know that container labels have the proper information of the disposal recommendations for most substances. Be certain a toxic product is needed before using it, and teach them about alternative products that might be able to do the same job they are looking to fulfill.

Chapter 2 - Household Hazardous Waste Project

Introduction

Johnson County government is responsible for the use of safe and environmentally sound management of solid waste within the county's boundaries. The County is required to adopt and implement a solid waste management plan (SWMP) in accordance with state regulations and is responsible for ongoing planning for systematic management of solid waste within the county. The plan provides for a solid waste management system that serves all solid waste generators within the County.

Over the past five years, Johnson County government, through the leadership of the Board of County Commissioners (BOCC) and the Solid Waste Management Committee (SWMC) and the efforts of the Johnson County Department of Health and Environment (JCDHE), has made significant contributions to improving solid waste management in Johnson County. During this time, review and revisions of the County Code of Regulations for Solid Waste Management ensured that 100 percent of the single-family households in the County have access to curbside collection of recyclable materials and that yard waste is collected for composting instead of disposal.¹²

The JCDHE protects public health and the natural environment through a number of programs. Program areas specific to solid waste management are Municipal Solid Waste (MSW) reduction, recycling, and composting education and outreach. MSW facilities have oversight of residential hauler licensing and the safe and environmentally sound management of non-MSW wastes and household hazardous wastes. The department also investigates and assures proper cleanup of illegal solid waste dumps in the county, and serves as staff support to the SWMC. Only the city of Olathe, one of 19 incorporated cities in the county, directly manages its own

residential solid waste. Eleven residential solid waste collection firms operate in the County one public, 10 private.¹⁰

The SWMC recommendations are for solid waste reduction via source reduction, recycling, and composting, with emphasis on promoting the reduction of commercial and multi-family waste collected for disposal. Other recommendations are given for managing construction and demolition (C&D) debris and the continued support of residential recovery and composting.¹¹

The construction of the Household Hazardous Waste site (HHW) started in June 1992, and is centrally located within the 40 acres of two publicly-owned treatment works (POTW). This was a perfect place for the construction of this building as Johnson County's Hazardous Material Collection Facility (HMCf) is right next door so materials they cannot accept can be taken next door. The partially completed site opened June 13th 1993. In 1999, the Environmental Department applied for a grant from KDHE to complete construction at the hazardous material collection facility for an enclosed material handling area and staff offices area. The grant was extended to December 2002. The facility now consists of three concrete containment areas and is fully enclosed.

Funding for ongoing operations comes from a contractual agreement with Deffenbaugh Industries, Inc. This is the trash service that operates in Johnson County, and it is the largest privately owned land fill in the U.S. This agreement also benefits Deffenbaugh Industries by keeping hazardous waste that could potentially seep out of the land fill and contaminate the surrounding environment. There are currently county funds that are being used to supplement the site, as Deffenbaugh Industries ceased its funding in 2013.

The collection program at the HHW sites was originally designed to serve the public primarily by having one Saturday open drop-off event per month, April through November. A limited, by appointment-only schedule was also available during the week. Mobile pickups were available to homebound residents within the County.

Due to the difficulty of managing an unknown and often time's large number of participants on a Saturday events where anywhere from 125 to 500+ vehicles would visit the site Safety issues became apparent when working during the summer heat. It was decided in 1995 to eliminate the Saturday events during July and August and start moving more and more participants to weekday appointments.¹¹

The county site accepts adhesives, car batteries, brake fluid, compact fluorescent lights, herbicides, kerosene, propane cylinders, and paint to be used in their paint reused in their paint redistribution program. Many of the materials that they accept if they (as determined by employees working at the HHW site) are still good are given away for in their free store and is open to anyone in the County. The free store has quality used products that can be used for people's next project or household needs. The products found in their store include but are not limited to: household cleaners, propane tanks, stains, motor oil, and car care products.

At the HHW site paint is one of the largest quantity of items they recycle. The site takes the high quality latex paint from Johnson County homes that is blended at the HHW facility, and made available for purchase in 5 gallon buckets. The paint is inspected for quality before it is separated into various colors. The sale of the paint helps fund the Johnson County HHW Program. This county program has helped paint countless homes throughout Johnson and Wyandotte County. This program has even helped paint a village in Ghana. Since the HHW

started their digital book keeping in 2004 of the appointments made to their site, they have served 92,402 out of 212,882 households in the County.

The rest of the items that are not found in the free store are disposed of in environmentally responsible means. Car led acid batteries and rechargeable batteries are recycled. Alkaline batteries commonly used in products such as flashlights, toys, and pagers can be disposed of in the trash. Oil-based paint, solvents, stains, thinners are considered bulked flammable liquids are reused as a fuel in cement kilns. Poisons, corrosives, acids, aerosols are disposed of by incineration or neutralized. Material is picked up by a hazardous waste contractor. Our current contractor is Philips Services Corporation which has a local office in Kansas City. Tires are recycled through a local tire collection service for reuse or energy recovery. Used oil is reprocessed by a recycling company.¹¹

Objectives of the Project

The overall objectives of the HHW project are as follows: 1) Organize the excel appointment data from the Johnson County HHW site, separate data that was not within the County and organize the total number of appointments to each designated zip code within the County; 2) Synchronize the data that we have collected over the past 10 years into Arc Map, a geo spatial program; 3) Research the population demographics in the County to make sure we are reaching each race and ethnicity in the volumes we should according to the demographics; 4) Find any other factors that may contribute to underservicing specific populations in the County.

As part of the Health Equity Team in the summer of 2016 the Arc Map layers I built will continue to be used for other student interns and fellowships. The students will be able to use and build upon the layers I have created in their projects. This is done as part of the continuing

objective of Johnson County to continue to ensure their services are provided equally to all genders, race, ethnicity, income, and different disabilities.

My project was also accepted to be presented at the North American Hazardous Materials Management Association (NAHMMA) which my preceptor Julie Davis will be presenting on October 12th 2016 in Portland, Oregon. This will hopefully provide other HHW sites in North America with a model of how to break down population demographics to see areas in the county, and demographics that they may also be missing with their programs.

Materials and Methods

Organization of Johnson County HHW Information & Arc Map

The first step in my project was to find a quick way to organize the HHW appointment data from 10/18/05 – 6/11/15 making up 92,402 data entries. We ended up only using 2005 – 2015 as these are years we had complete data from in electronic format. Using the knowledge I had gained from DMP 830 Quantitative Analysis taught by Dr. Dritz, I was able to manipulate the data more quickly, such as using IF-THEN statements in Excel. If the zip code was one of the counties listed as in Johnson County then it was listed as IN, if outside the County it was listed as OUT as an automatic function of the Excel statement. I did this all on one bulk tab so as they continued to enter data into this tab the statement would continue to function.

In my first week I also autonomously taught myself how to operate and synchronize data from Excel into ArcMap. ArcMap is the main component of Esri's ArcGIS suite of geospatial processing programs, and is used primarily to view, edit, create, and analyze geospatial data. ArcMap allows the users to explore data within a data set, symbolize features accordingly, and create maps. This is done through two sections of the program, the table of contents and the data frame. Once I became familiar with the program, it became the most essential tool in my project

allowing us to visually represent data in the map of Johnson County. The County epidemiologists routinely make use of this program in their field of study to visualize different outbreaks and track trends.

Results

After organizing all the data into those two categories, I was able to make multiple pivot tables one as all the data for the 10 years total, and one for each individual year. This allowed me to quickly consolidate all the appointments into their designated zip codes in total and by each year. This quickly changed the total number of appointments that were relevant to our study by reducing it to 88,259 making the sites average customers served from one year 8,826. In order to make the data more relevant when loading it into the Arc Map program the average for all ten years was taken from each zip code to represent on the map.

Figure 1 Appointment Density by Zip Code for Johnson County HHW Site

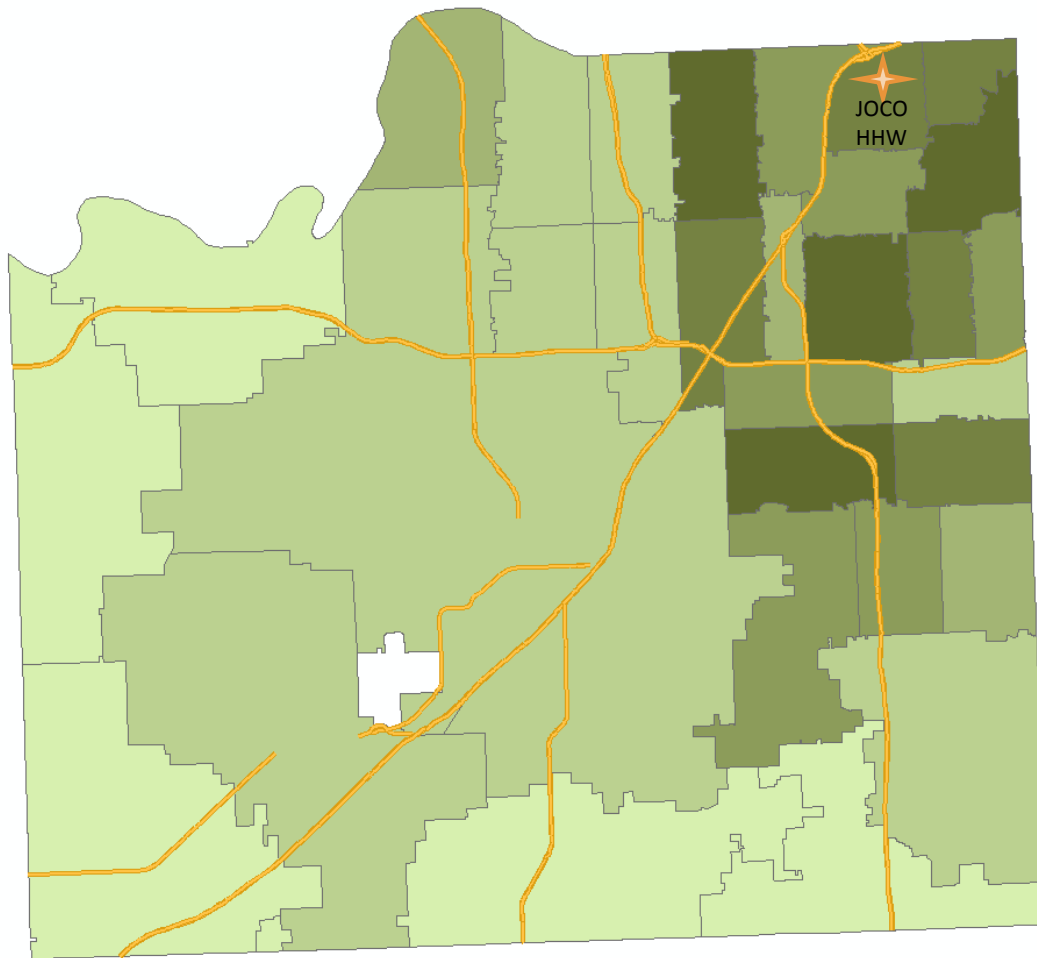
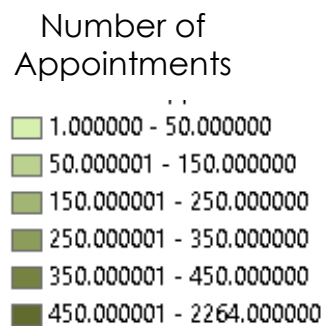


Figure 1: Displays the appointments density of the zip codes that made an appointment to the Johnson County HHW Site.



Knowing that there was another HHW site run by the city of Olathe that also serves the population of Johnson County we were able to get their zip code appointment information. Using the same steps as described above, the data was sorted and input into the Arc Map program as well as a separate layer. We did have to extrapolate the data for a missing month that was not included in the data to give a better representation of the numbers they would actually serve in a given year. We found that almost 70% of their appointments originate from two zip codes; 66061 30% and 66062 made up 37%. This gave us the following map:

Figure 2 Appointment Density by Zip Code for City of Olathe HHW Site

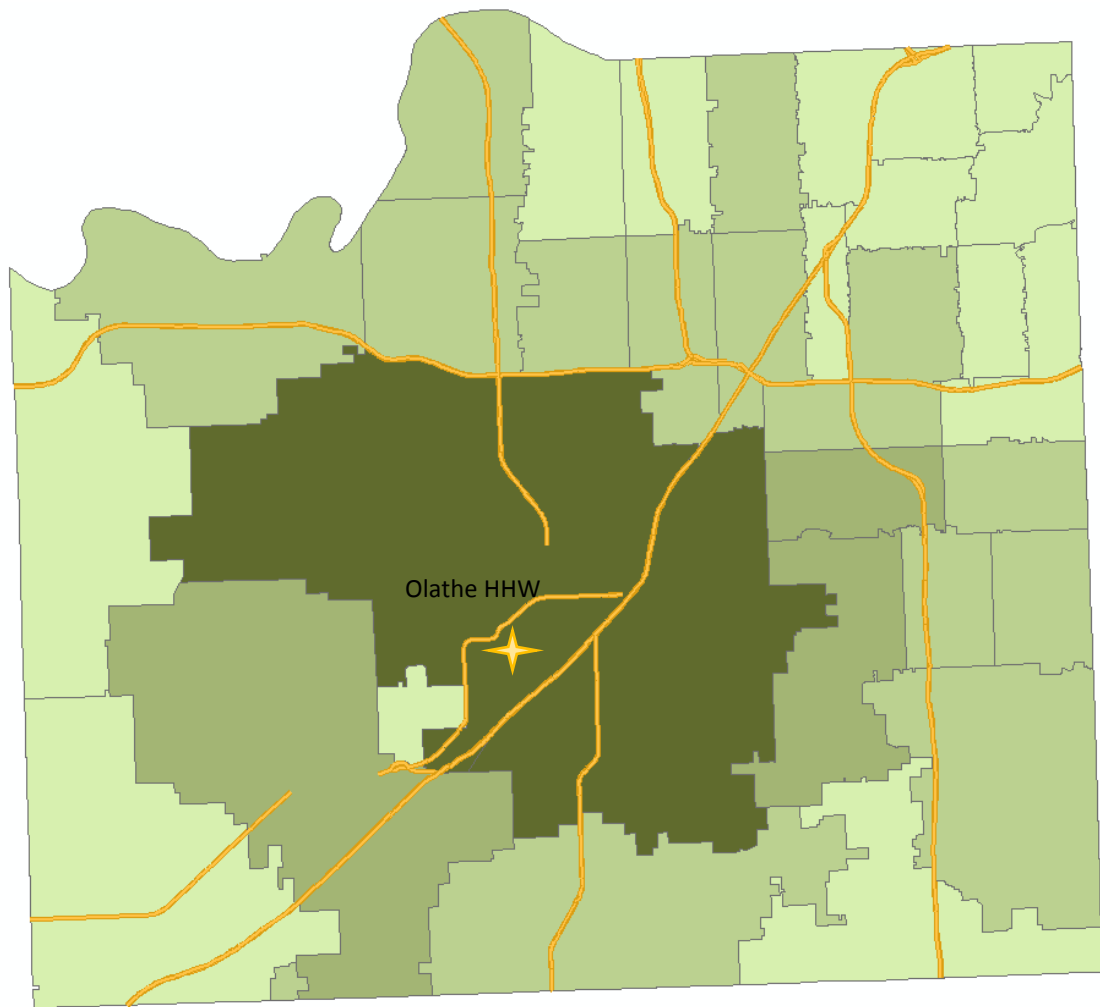
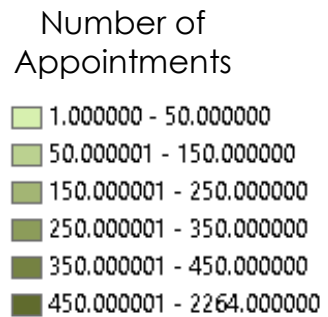


Figure 2: Displays the appointments density of the zip codes that made to the City of Olathe HHW site.



In order to give a better representation, it was decided to combine the two groups of data into one. This would allow us to see areas in the county that were being underserved by the two HHW sites. We found that between the two sites they were serving on average about 14,000 customers per year.

Figure 3 Appointment Density by Zip Code for Both HHW Sites

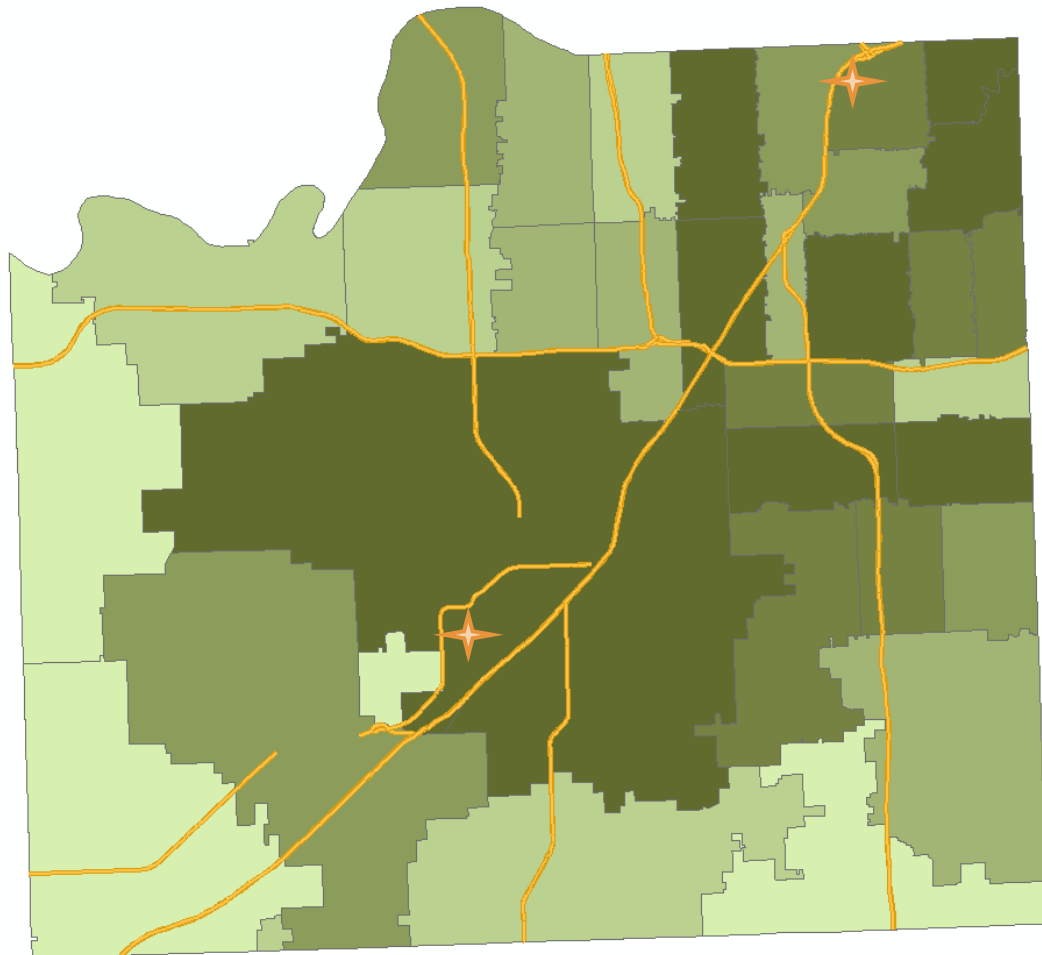
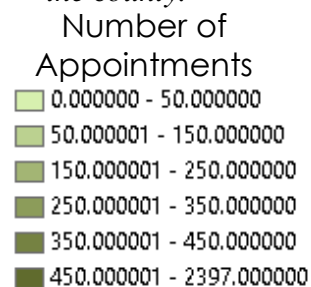


Figure 3: Represents appointment density made to both HHW sites for each zip code in the county.



However we are still missing areas around the perimeter of the county. We found that this appeared to be due to less population in those areas that have lower number of appointments, as shown by the population density map layer that was created.

Figure 4 Population Density Overlay on Appointment Density by Zip Code for Both HHW Sites

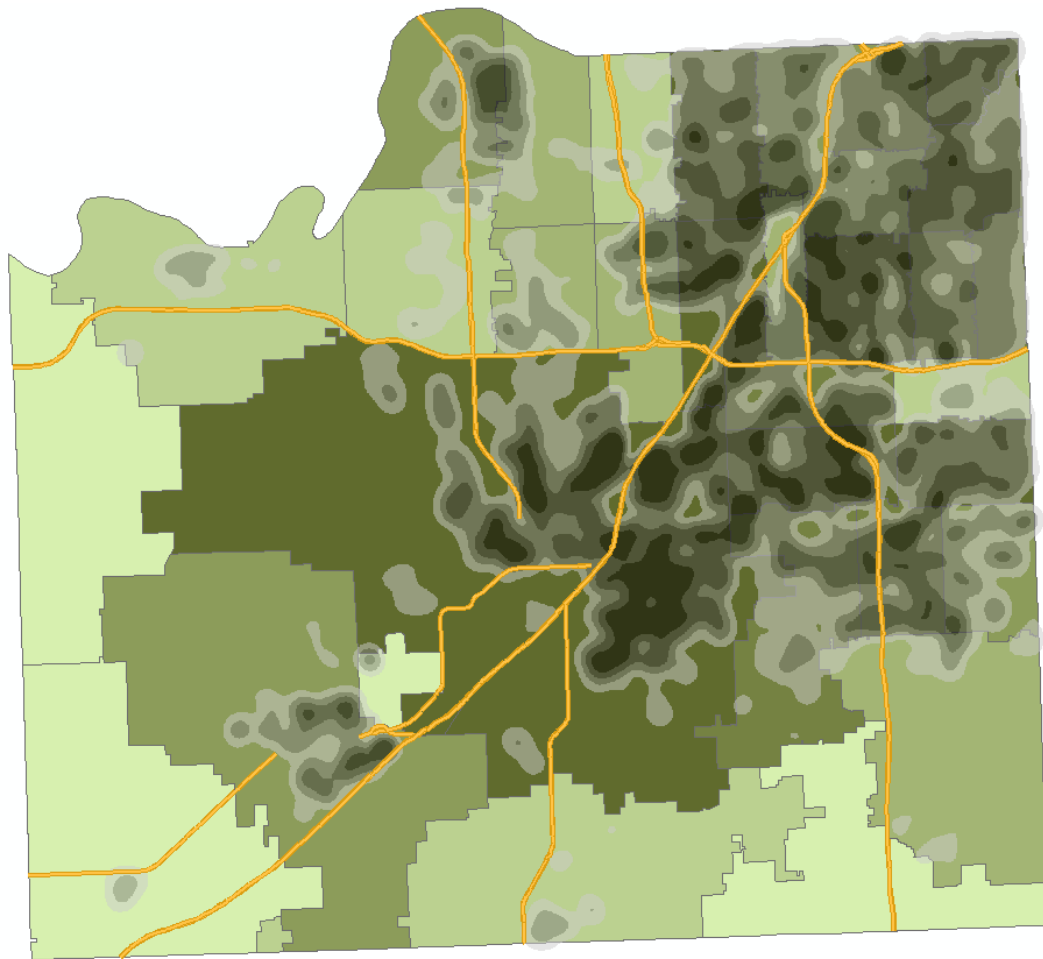
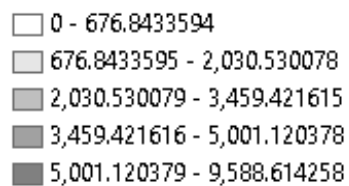


Figure 4: *Population density map layer was created based off 2010 census data with a population of 544,719 represented in this layer.*

Population Density



With population density properly represented on the map we see that areas where the population is most dense closely correlates with the number of appointments that are received by the two HHW sites. However, could we better serve the population by looking in the demographic make-up of Johnson County, and figure out what might be restricting different demographics from using the HHW facility?

Chapter 3 - Population Demographics

In this area of the research we used The American Community Survey (ACS), a nationwide continuous survey designed to provide communities with reliable and timely demographic, housing, social, and economic data. The ACS samples nearly 3 million addresses each year, resulting in nearly 2 million final interviews. The ACS replaces the long-form decennial census; however, the number of household surveys reported annually for the ACS is significantly less than the number reported in the long-form decennial census. As a result, the ACS combines detailed population and housing data from multiple years to produce reliable estimates for small counties, neighborhoods, and other local areas. Negotiating between timeliness and accuracy, the ACS annually releases current, one-year estimates for geographic areas with large populations; three-year and five-year estimates are also released each year for additional areas based on minimum population thresholds.¹⁰

Methodology

Population counts for demographic groups and total area population data were acquired from the U.S. Census Bureau's American Community Survey. Data represent estimates for the 5 year period 2010-2014. Mapped data are summarized to 2010 census tract boundaries.

Population density is a measurement of persons per square mile. Area demographic statistics are

measured as a percentage of the total population based on the following formula: Percentage = [Subgroup Population] / [Total Population] * 100

Notes: Race and ethnicity (Hispanic origin) are collected as two separate categories in the American Community Survey (ACS) based on methods established by the U.S. Office of Management and Budget (OMB) in 1997. Indicator race and ethnicity statistics are generated from self-identified survey responses. Using the OMB standard, the available race categories in the ACS are: White, Black, American Indian/Alaskan Native, Asian, and Other. An ACS survey respondent may identify as one race alone, or may choose multiple races. Respondents selecting multiple categories are racially identified as “Two or More Races”. The minimum ethnicity categories are: Hispanic or Latino, and Not Hispanic or Latino. Respondents may only choose one ethnicity. Total population counts are reported in the ACS public use files by combined race and ethnicity; social and economic data are reported by race or ethnicity alone.^{10,13}

Population Demographics

Johnson County has a population of 560,025 and 210,278 households of which 143,509 are families. The County also has the highest median household income and per-capita income in Kansas representing almost 28% of the state’s total income.⁷ As seen in Table 1 below, the population of the County is predominantly White and Non-Hispanic.

Table 1 Population Race and Ethnicity

Race	Percentage	Ethnicity	Percentage
White	87	Non-Hispanic	93
Black/African American	4.3	Hispanic/Latino	7
Asian	4.2		
Native American	0.4		
Pacific Islander	0.01		
Other Race	1.55		
Two or More Races	2.5		

Note: Shows each Race & Ethnicity as the percentage they represent in the county.

Keeping these demographics in mind and based on the percentage for each race and ethnicity we should serve the following demographics at the HHW site.

Table 2 How Many the Site Should Serve in a Year by Race and Ethnicity

Race	Number we Should Serve	Ethnicity	Number we Should Serve
White	7,678	Non-Hispanic	8208
Black/African American	411	Hispanic/Latino	618
Asian	353		
Native American	35		
Pacific Islander	1		
Other Race	137		
Two or More Races	221		

Note: Based on the average number of appointments per year. The site should observe the following numbers from each race & ethnicity.

Calculation = (Race/Ethnicity %) x (average number of appointments per year)

Other Factors Contributing to Underservicing Specific Populations

Specific factors found within the population demographic that may hinder them from using the HHW sites services include: Population with limited English proficiency, self-reported disabilities, households with no motor vehicle, poverty, education, migration into the County, and where households are most densely populated within the County. It was felt that if we are able to mitigate the challenges that these populations might face in receiving the proper information, or better accessibility to our facilities we will be able to better serve these potentially underserved populations.

Population with Limited English Proficiency

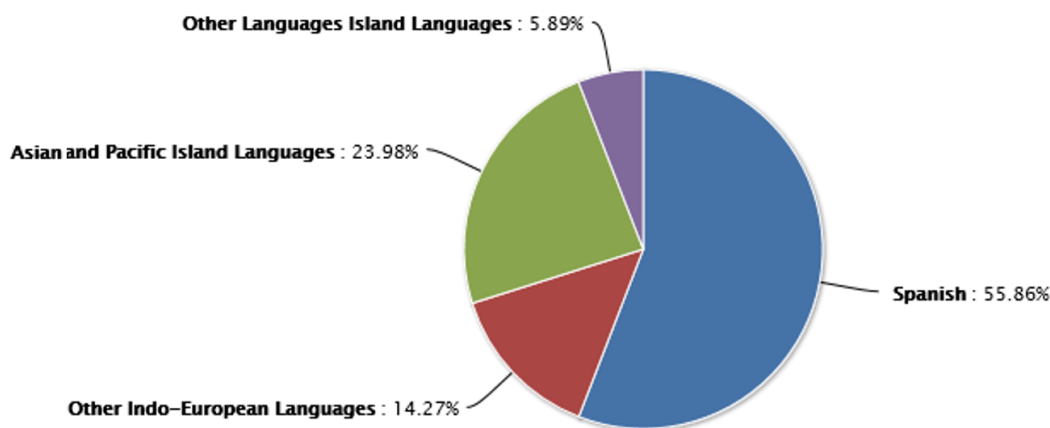
Limited English proficiency is a problem for the HHW site as the website to make an appointment is written in English, as well as the brochures, and if customers would rather call in to make their appointment the County only has English-speaking receptionists to answer the phones. While the County has a small percentage of the population 3.8% or 21,281 individuals

we want to serve every population evenly in respect to the size of that population.⁷ We looked at Race and Ethnicity to find out if that was the major factor.

When looking at Race, White made up the greatest majority of limited English proficiency at 60.23% followed by Asian at 27.36%. However this does not tell us what language they are speaking other than English, as many Hispanic individuals may self-identify as Black/African American Hispanics, or White Hispanic; thus we must look at ethnicity.

The Spanish-speaking population made up the largest majority of ethnicities with limited English proficiency at 55.8% or 11,888 individuals followed by the Asian speaking population at 23.9% or 5,099 individuals.⁷ The other populations made up such a small percentage that singling out services to them would cost much more than the potential payoff would be worth.

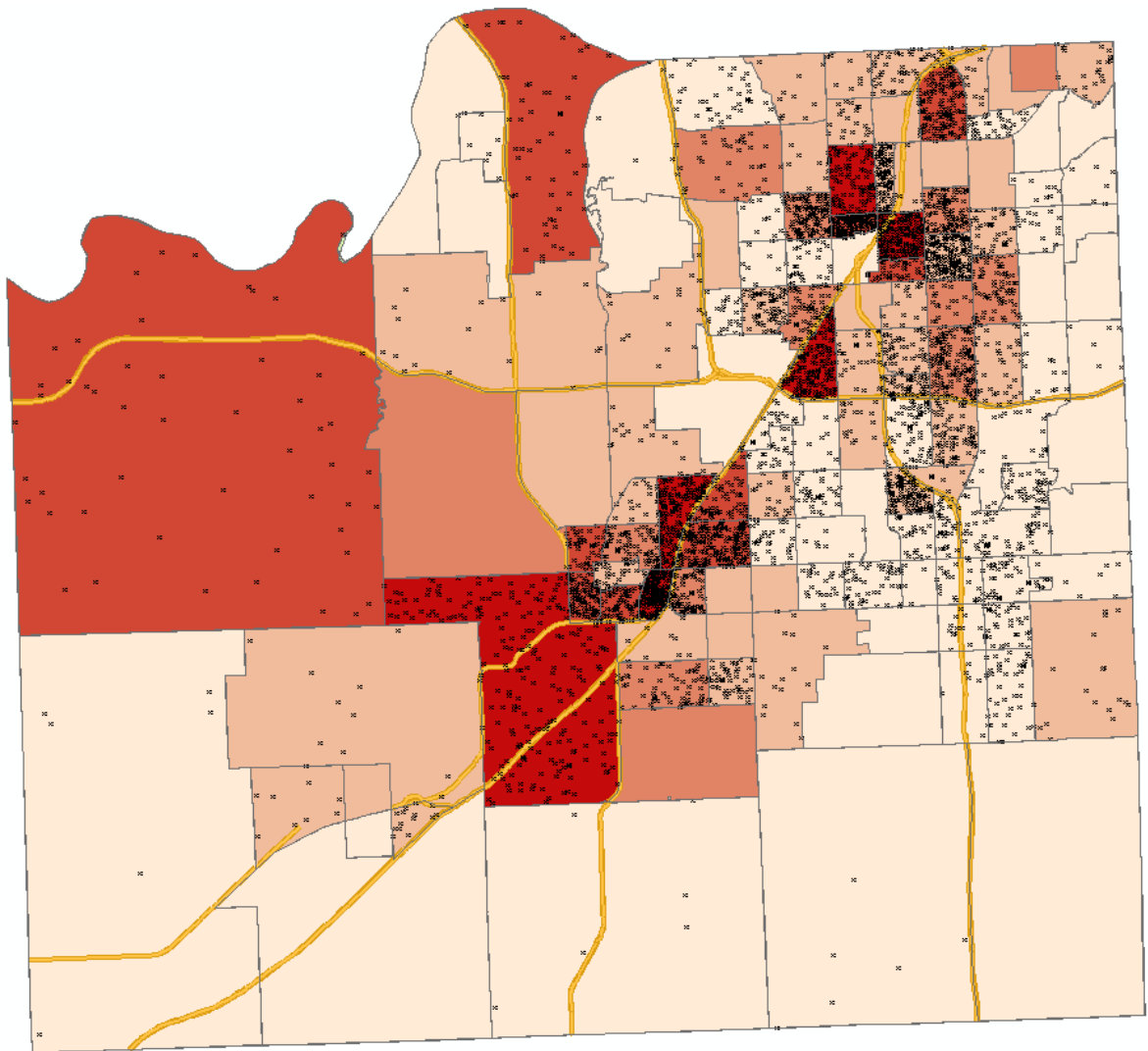
Figure 5 Pie Graph of Languages Spoken in the County Other Than English



Note: *Figure Pulled from ACS*

Knowing the Ethnicities that may be underserved by our facilities is only part of the battle we also need to know where these populations are located within the County.

Figure 6 Hispanic/Latino Ethnic Population and Limited English



Note: The chlorophyll layer represents the Hispanic/Latino population in the County, the darker the red the more dense the Hispanic/Latino population is in that area. Each (x) represents 1 person in the County with limited English proficiency.

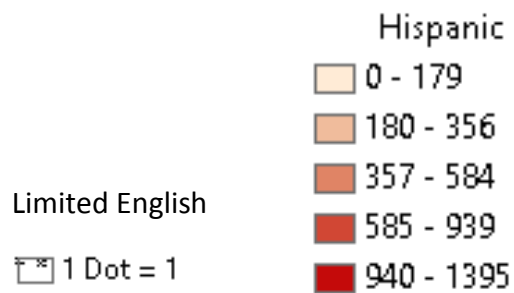
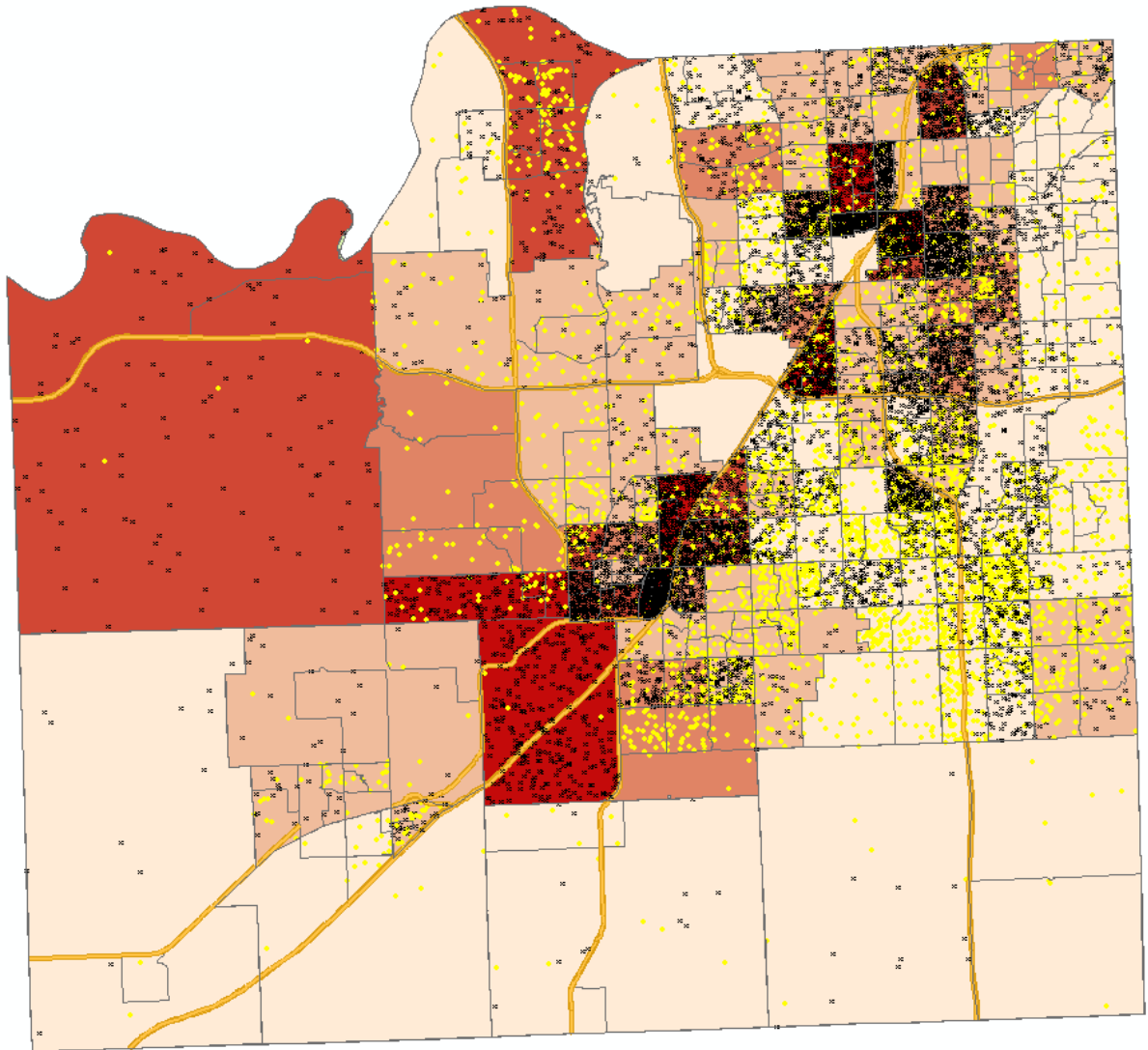


Figure 7 Asian Ethnicity with Limited English



Note: The chlorophyll layer represents the Hispanic/Latino population in the County, the darker the red the more dense the Hispanic/Latino population is in that area. Each yellow dot represents 5 people of Asian Ethnicity. Each (x) represents 1 person in the County with limited English proficiency.

Asian

1 Dot = 5

With the Ethnicity information from ACS transferred into Arc Map in the form of Block Group, we see much more specific areas in the County where we need to focus our efforts towards those with limited English.

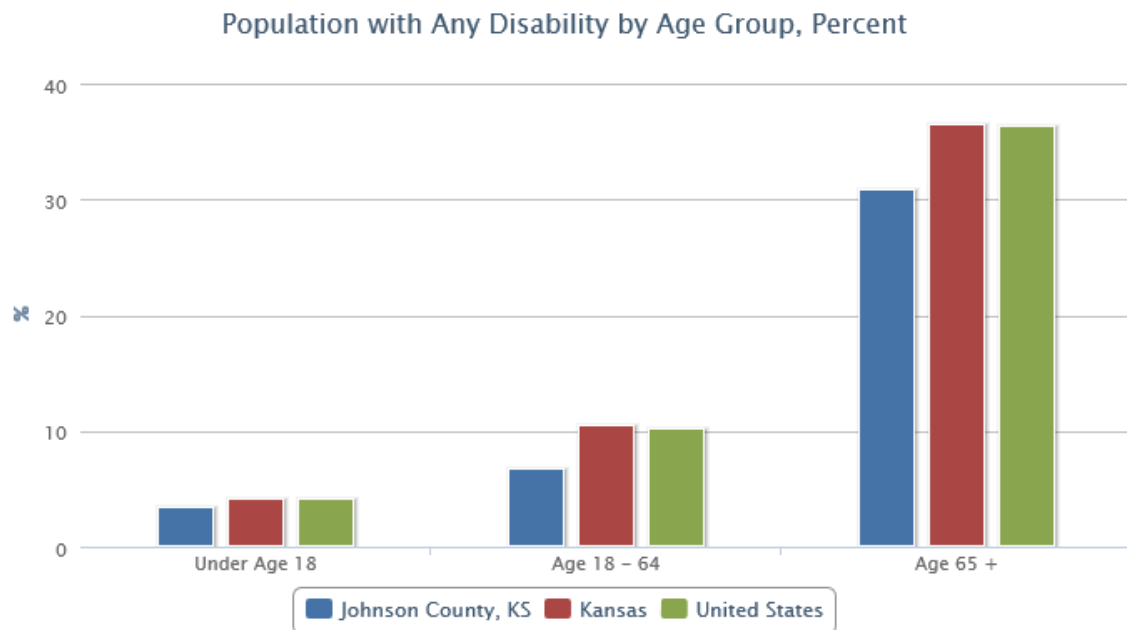
Recommendations

Consider having a button on the Johnson County website that translates the appointment from into Spanish, as this is the largest ethnicity with limited English. While the Asian ethnicity consists of a wide range of languages actually spoken, we should consider making the electronic appointment form using very simple English to bring it down to a 5th grade reading level. Bringing down the reading level should make it easier for people visiting the website to schedule an appointment much easier for them to comprehend.

Mobile Pickup: Population with Disabilities and Households with no Motor Vehicle

The County has a population of 14,871 or 8.61% who report having some sort of disability with the largest age 65+ (30.86%).⁷ The inference was made that this age group was most likely to have a physical handicap due to their age that may not be capable or unsafe for them to load a vehicle with household hazardous waste.

Figure 8 Population with Any Disability



Note: *This chart represents the populations with a self-reported disability to ACS by age group.*

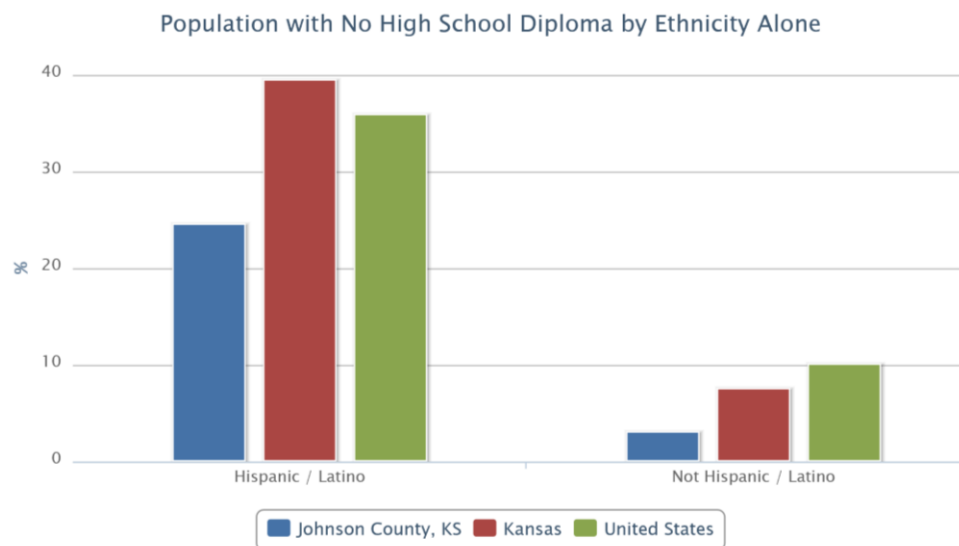
Households with no motor vehicle is a population that makes up a very small percentage of the population at 7,700 of the 210,278 households in the county⁷. However we can improve our service to both these populations by promoting our mobile pick up service on the County website, and on the electronic appointment form. Currently the HHW site is only averaging about 50 mobile pickups a year. While we don't know if we are under serving this population, more outreach should be done to ensure they are made aware of this service. We can do our part at the county to make sure this is prominently displayed, and made aware of to the population when they visit the site to schedule an appointment.

Education

While education level is more of a social and economic factor, it could play a role in certain populations we might be missing to low education levels. Within the report area there are 16,152 people age 25+ with no high school diploma (or equivalency) or higher. While this only

represents 4.3% of the population it is of concern to us, because people without high school education will be more likely to dispose of hazardous materials improperly simply due to not knowing about the sites service. There is also a disparity among ethnicity, as 24.61% of the Hispanic/Latino community make up a large percent of that population as only 3.12% of Non-Hispanic's have not received their high school diploma as illustrated below.⁷ That being said this is a well-educated county with 222,066 people or 59.4% of the populations having an associate's degree or higher. This is 21% higher than Kansas as well as the United States.⁷ As we will continue to see this might require specialized outreach methods just for the Hispanic/Latino community.

Figure 9 Population with no High School Diploma by Ethnicity Alone



Note: *Ethnicity percentage of the population with no High School diploma.*

Population in Poverty

The County has 36,000 individuals or 6.5% of the population is living in poverty.⁷ Looking at ethnicity the ACS reports that this was primarily the Hispanic population in the county making up 25% of the 6.5%. We felt that promoting the free store to areas in the county where poverty is prevalent will not only help these impoverished individuals to keep up and

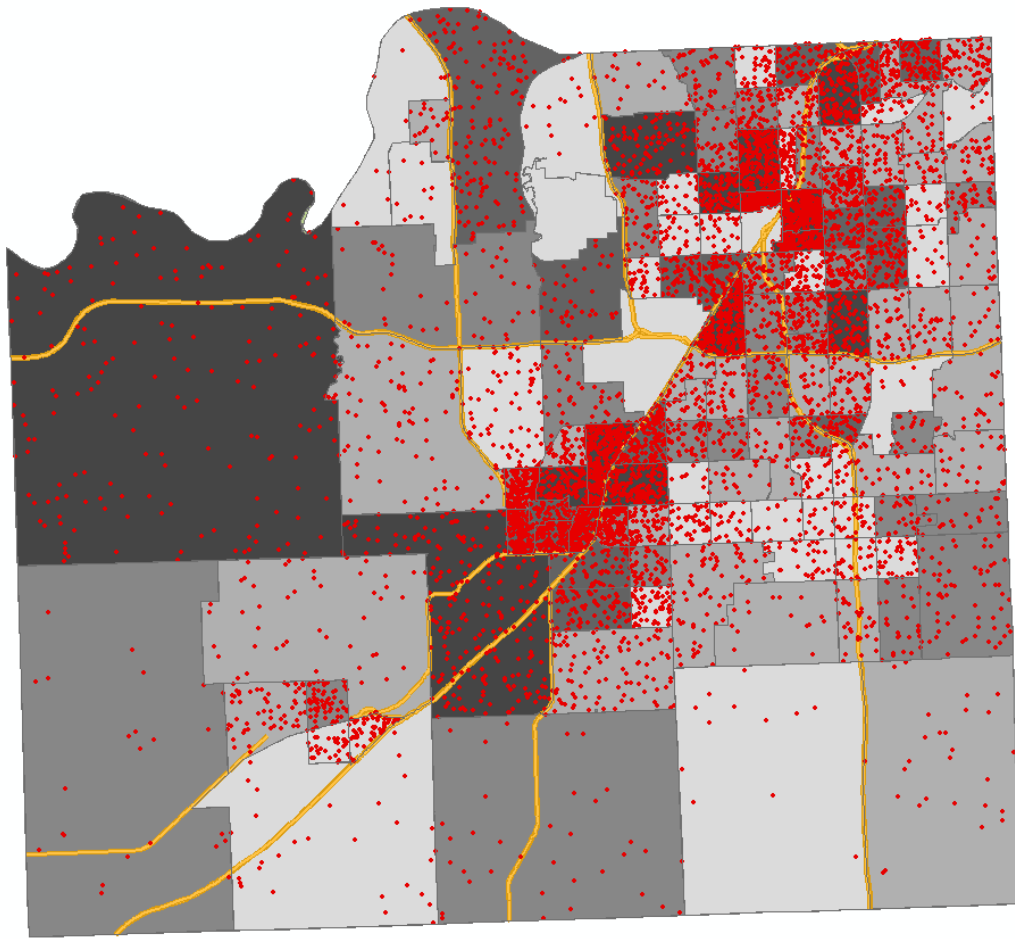
maintain their houses, yards, and vehicles, but would also be more willing to use the HHW site for disposal of their other household hazardous waste.

Figure 10 Preliminary Estimate of Weights Average Poverty Thresholds for 2015

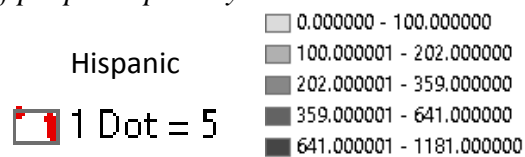
U.S. DEPARTMENT OF COMMERCE	
BUREAU OF THE CENSUS	
WASHINGTON, D.C. 20233	
PRELIMINARY ESTIMATE OF WEIGHTED AVERAGE POVERTY THRESHOLDS FOR 2015	
Size of Family Unit	Estimated Threshold
1 person (unrelated individual).....	\$12,085
Under 65 years	12,331
65 years and over	11,367
2 people	\$15,397
Householder under 65 years	15,953
Householder 65 years and over	14,343
3 people	\$18,872
4 people	24,259
5 people	28,729
6 people	32,512
7 people	36,971
8 people	41,017
9 people or more	49,079

Note: Figure pulled from United States Census Bureau. *Poverty Thresholds*. Retrieved from: <http://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html> Accessed July 15, 2016.

Figure 11 Poverty and Hispanic/Latino Population



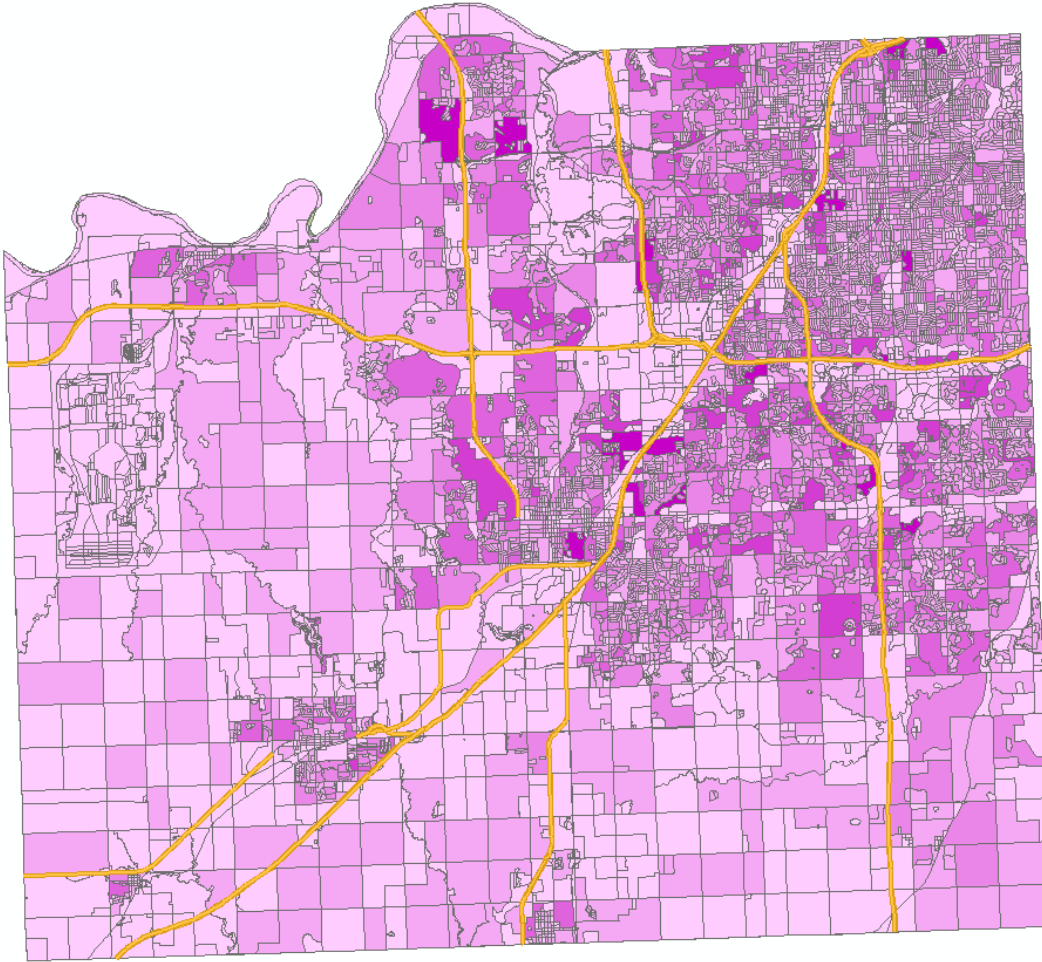
Note: Each red dot represents 5 people of Hispanic/Latino Ethnicity. The grey fill layer represents the number of people in poverty.



Household Density and Migration into the County

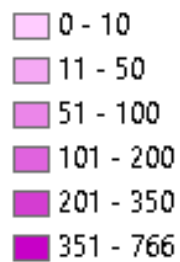
Using a household density map by block group gives us a much more specific area as to where to send mailers out to in the county without just covering whole zip codes. This way we can target specific areas within a zip code to save money for the county and tax payers, while also hitting our targeted demographic.

Figure 12 Johnson County Map of Occupied Home Density



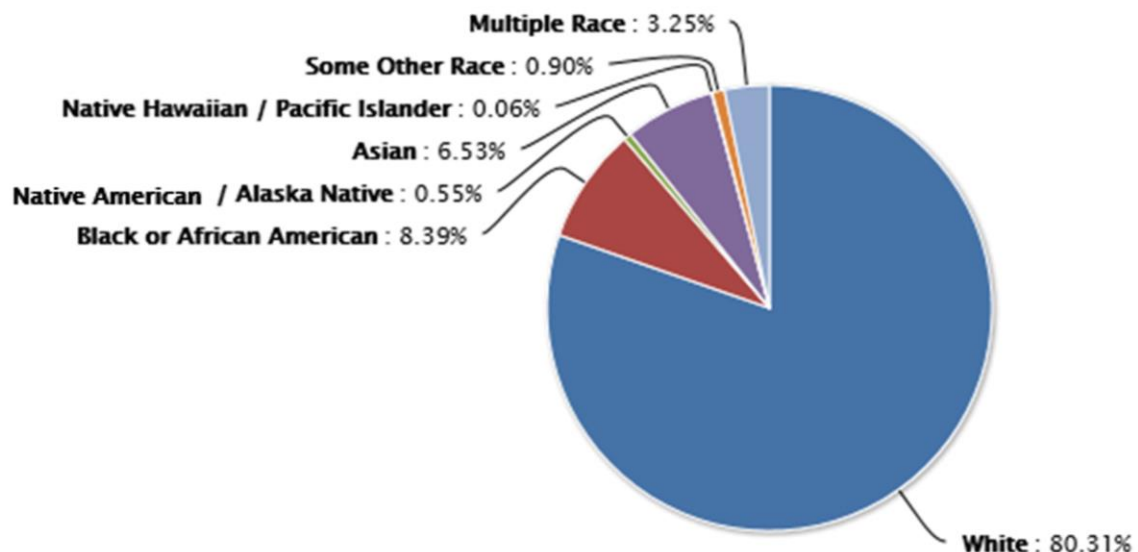
Note: *The darker the pink represents areas with more densely occupied households in the County.*

Occupied Home
Density



From 2014-2015 35,706 new residents entered the County.⁷ These are people who are most likely to be looking at the market for a new home. After buying a house usually comes home renovation, and the accumulation of household hazardous waste. Making it imperative to reach this population to make them aware of the services provided at the HHW site. In order to reach them the county should work with the 19 cities within the county to provide them with our flyer when they send a new home owners/welcome packet when the residents move in. A second alternative could be used when the cities have an account change in the utilities provided to households to send one of our flyers out to them with their first bill. By working with the cities we can be sure we are covering new residents to the county equally.

Figure 13 Population Demographics Migrating into the County from 2014-2015



Note: *Figure pulled from ACS*

Current Outreach by the County

Johnson County currently spends \$5,000 to \$10,000 a year in internet and radio ads. They have used advertising on Spanish radio in the past but with little success in increased numbers by

the Hispanic population. They have also incorporated free media into their advertising on city websites in the county, and county newsletters.

Suggestions Going Forward

Collect real time data on the website when residents of the County are scheduling an appointment for drop off. Including Race, Ethnicity, and how did you hear about the HHW program. By tracking the Race and Ethnicity of the population we can make sure we are reaching all races and ethnicities equally according to table 2. By knowing how people are finding out about the program the county will know what avenues of communication is reaching the population and what is not working. There should also be an area where they can schedule online for a mobile pickup service to come to their house for the physically disabled, or those households with no vehicle, as the HHW site is currently only average about 50 pickups a year.

When sending out fliers use the household density map to target those areas where households are most dense in order to conserve on wasteful spending. These flyers should be easy to read at a 5th grade reading level, and promote the free store, as well as the mobile pickup service provided. Finally work with the 19 cities within the county to provide the HHW flyer in their new home owner or welcome packet. You could also achieve the same goal when there is an account change in the cities utilities to provide your flyer in their first bill or when they use the online payment system.

Conclusion

It appears that both HHW sites are serving the majority of the County as they have served 92,402 people over the past 10 year's averaging 8,826 appointments per year out of the 210,278 households in the County.¹³ That being said the County may consider looking at correlation

values of the number of appointments they receive from each zip code and the population residing in each zip code. That way the county will know if the appointments really are correlating with the areas with zip codes that are densely populated.

As part of the Health Equity Mission of Johnson County, race and ethnicity from clients' needs to be a part of the online appointment schedule so the County knows that no one specific sub-population is being underserved. If there is a specific sub-population being underserved the County will have no idea if they are not taking some sort of measurement on race and the ethnicity of their clients.

Chapter 4 - Other areas of the rotation (40 hours)

Health Literacy

During orientation we were taught about health literacy in patients that have limited understanding of medical terminology. The class look at how the medical community can more effectively communicate to them how to take their medication, and communicate to them in laymen's terms what for example: hypertension means high blood pressure. This also mean explaining to patients what blood pressure numbers mean. Example: The top number (high number) is the pressure measured in the arteries when the heart contracts, and the bottom number (low number) represents the pressure in the arteries between hearts beats when the heart is resting (refilling with blood). Having been educated in public health we sometimes do not realize what is simple communication amongst coworkers is difficult to understand for people unfamiliar with terms we commonly use.

Zika Surveillance

I was fortunate to sit in with the heads of the health department during discussions of Zika virus preparedness in Johnson County. As of 6/18/2016 Johnson County had its first travel-

related case of Zika. Currently Kansas City, Missouri is not doing any surveillance in the city or anywhere in Missouri. Johnson County Department of Health and Environment is working with key partners to assure the dissemination of updated, accurate and consistent information. Partners include the Kansas Department of Health and Environment, the Johnson County Manager's Office (Public Information), Johnson County Emergency Management, the RHSCC Public Health Subcommittee Risk Communications Task Force and the Johnson County K-State Research and Extension Office. If Johnson County has a case of microcephaly caused by Zika virus infection, KDHE will issue a press release, patient identification will be limited, and KDHE will serve as media spokesperson about confirmed microcephaly cases.

County Pools

Shadowing Steve Volgolson inspecting public pools in the county, we checked that they were complicit with county regulations in their water parameters, signage, records, and lifesaving equipment. We actually had to shut down one pool as their water parameters were out of the county code requirements. Mr. Volgolson told me that last summer there were five city/subdivision pools he had to shut down due to finding *Cryptosporidium*.

Cryptosporidium (or "crypto") is very tolerant of chlorine, so even well-maintained pools and interactive fountains can spread Crypto among swimmers. During cases of an outbreak, the health department requires the pool to close. Then to hyper-chlorinate until the hyper-chlorination the pool till the hyper-chlorination is completed. Immediately after raise the pool water's free chlorine concentration, maintain pH of 7.5 or less, and a temperature of 77F or higher. The last step is to achieve a concentration time inactivation value (Ct) of 15,300 to kill Crypto. The Ct refers to the concentration of free chlorine in parts per million (ppm) multiplied by time in minutes at a specific pH and temperature. Confirm that the filtration system is

operating while water reaches and is maintained at the proper free chlorine level for disinfection. Backwash the filter thoroughly to ensure any Crypto is washed out of the filtration system. Finally the pool can be reopened to swimmers.⁶

Green Team

The County has also formed a “Green Team” within the Health and Environment Department to look at its energy use of computers within the building. Screen savers are not energy savers, in fact, they can cause a computer to burn twice as much energy. Screen savers were originally developed to prevent permanent etching on older monitors. But modern display screens do not suffer as much from this problem. It was recommended by a student intern who did a study on the computer energy consumption within the department and recommended that employees update power saving settings in order to save energy. Using power-management settings like sleep mode is the best way to reduce the buildings energy use. The recommended settings are for your computers to auto-enter sleep mode after 30 minutes of inactivity and turn off the display after 5-15 minutes of inactivity. The intern estimated that if all government computers in the county had these settings it would save ~\$20,000 per year.

Landfill Air Quality

I was also able to shadow Brandon Hearn at the Johnson County Department of Health and Environment. The County works in conjunction with Kansas Department of Health and Environment and APAC Reno Construction and Demolition (C&D) at their landfill to conduct monitoring efforts for Hydrogen Sulfide (H₂S) gas. The air monitoring consist of 5 monitoring stations around the perimeter of the APAC Reno C&D landfill. The buildup of H₂S in small doses can be a nuisance and in higher concentrations can lead to health issues. The process of checking the monitors involves JCDHE staff pulling the AppTek monitors, connecting them to

the OdaStat program and downloading the logs. Through the use of these logs technicians can monitor the weather parameters that may have contribute to spikes of Hydrogen Sulfide gas.

WIC

Women, infant, and child program (WIC). On Tuesdays employees of the county along with WIC clients would meet out in the County community garden at the Olathe clinic to cultivate fresh vegetables. Johnson County Government is committed to improving the health of all Johnson County residents by improving access to healthy foods in the community. We strive to achieve this goal through administering a WIC program and the WIC Community Garden. The WIC Community Garden educates, empowers and feeds the clients in the Kansas WIC program, thereby creating a healthier community. WIC is a supplemental food and nutrition education program that provides services to Kansas families who qualify. WIC's goal is to help keep pregnant and breastfeeding women, new moms, and kids under age 5 healthy. To do this, WIC provides: Personalized nutrition information and support, checks to buy healthy food, tips for eating well to improve health, and referrals for services that can benefit the whole family.

As department and household budgets continue to get tighter, innovation and low cost solutions are a must. The County garden provides an opportunity for clients to supplements their monthly stipend with fresh produce at no cost while delivering interactive nutrition education. The garden is located on the Health Department property. Clients who volunteer are given first pick of fresh produce, and the remaining is distributed in the clinic. In the second year the garden has tripled in size, and over a ton of food was harvested and distributed to 850 WIC families. This program has become essential to WIC clients as in their study of client receipts used on by their monthly stipend, clients on average only spend \$6.00 on produce.

WIC also offers immunization screening and referral, breastfeeding support, and nutrition and health classes on a variety of topics including meal planning, maintaining a healthy weight, picky eaters, caring for a new baby, shopping on a budget and food packages.

Food packages for pregnant, breastfeeding, postpartum women, and children one to five years of age may receive: milk, natural cheese, eggs, iron-fortified cereal, vitamin C rich juice, dry beans, peas, or peanut butter, canned beans, tuna (as applicable), pink salmon (as applicable), fresh, canned, or frozen fruits and vegetables, 100% whole wheat bread, tortillas, and brown rice. Infants may receive: special breastfeeding support or infant formula for the first year, infant cereal starting around six months, phase two fruits and veggies, and pureed meats at an appropriate age.

Health Equity Meeting

At one of our health equity meeting we meet with one of the founders of the K.C. Care Clinic. The clinic was originally founded as the Westport Free Health Clinic in 1971 by a group of concerned citizens in Kansas City. The foundation was started on the principal that health care is a human right, not a privilege based on income; this mean caring about people. They wanted to not just treat the disease that patients had, but emphasis on health education, preventive medicine. The foundation believes that a lot of this can be accomplished through the use of Community Healthcare Workers.

Community Healthcare Worker (CHW) started in California primarily with the Latino community. Kansas has no definition of a CHW but the CDC defines them as frontline public health worker who is a member of the community served and improves the quality and cultural competence of service delivery.⁵

The role of CHWs is unique as they must be culturally competent mediators between healthcare providers and members of potentially diverse communities as well as addressing social determinant of health. They work to provide effective tools in promoting the use of primary and follow-up care for preventing and managing disease. Some of the disease they manage include asthma, diabetes, hypertension, cancer, maternal and child health, immunizations, tuberculosis, nutrition, and HIV AIDS.

The ground breaking change in policy of Centers for Medicare and Medicaid Services, in conjunction with policy support from the Affordable Care Act, has given hope of bridging the gap between mainstream health care and community health, through the expansion of CHW profession and its impact on the clinical care received.¹⁴

Hospitals in the area and the Federal Government funds the K.C Care Clinic. They focus primarily on the uninsured that use the E.R. as their primary care physician, and the hospital ends up having to cover the cost of the visit. The outcomes they have seen for the past calendar year include: 91% achieve care plan goals, 58% report improvement in overall health working with a CHW, 82% did not return to the E.R. within 90 days, and a 65% overall reduction in patient E.R. visits.

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